We claim:

1. An optical fiber exhibiting a beat length greater than about 0.5 meters, having a longitudinal axis with a spin impressed on the fiber, wherein over at least a portion of the fiber the spin impressed on the fiber is alternately clockwise and counter-clockwise, with a spin repeat distance of at least 1 meter and with a plurality of varying spin reversal distances occurring within the spin repeat distance, wherein the plurality of varying spin reversal distances comprises a minimum spin reversal distance and a maximum spin reversal distance.

2. The single mode fiber of claim 1, wherein the fiber exhibits a beat length of between 0.5 m and 5 m, the spin repeat distance is greater than about 10 m, and the resultant PMD from the spin impressed on the fiber is less than 0.1 ps/km$^{1/2}$.

3. The single mode fiber of claim 1, wherein the fiber exhibits a beat length of between 0.5 m and 5 m, the spin repeat distance is greater than about 10 m, and the resultant PMD from the spin impressed on the fiber is less than 0.05 ps/km$^{1/2}$.

4. The single mode fiber of claim 1, wherein the fiber exhibits a beat length of less than 5 m, the spin repeat distance is greater than about 100 m, and the resultant PMD from the spin impressed on the fiber is less than 0.05 ps/km$^{1/2}$.

5. The single mode fiber of claim 1, wherein the fiber exhibits a beat length of greater than 5 m, the spin repeat distance is greater than about 100 m, and the resultant PMD from the spin impressed on the fiber is less than 0.03 ps/km$^{1/2}$.

6. The single mode fiber of claim 1, wherein the fiber exhibits a beat length of greater than 1 m, the spin repeat distance is greater than about 200 m, and the resultant PMD from the spin impressed on the fiber is less than 0.02 ps/km$^{1/2}$.

7. The single mode fiber of claim 1, wherein the fiber exhibits a beat length of greater than 5 m, the spin repeat distance is greater than about 100 m, and the resultant PMD from the spin impressed on the fiber is less than 0.01 ps/km$^{1/2}$.

8. The single mode fiber of claim 1, wherein the fiber exhibits a beat length of greater than 10 m, the spin repeat distance is greater than about 50 m, and the resultant PMD from the spin impressed on the fiber is less than 0.01 $ps/km^{1/2}$.

9. The single mode fiber of claim 1, wherein the fiber comprises a segmented core profile having more than one core segment.

10. The single mode fiber of claim 9, wherein said fiber comprises a core profile having a central segment refractive index Δ_1, an annular segment surrounding the first segment having Δ_2, and a second annular segment surrounding the first annular segment having Δ_3, wherein $\Delta_1 > \Delta_3 > \Delta_2$.

11. A method of making an optical fiber comprising:

heating at least a portion of an optical fiber preform; and

drawing optical fiber from the heated preform such that a spin is impressed on the fiber by applying a torque to the fiber, said torque causing the fiber to undergo rotation around longitudinal axis of the fiber such that the spin is impressed on the fiber as it is drawn from the preform, wherein the optical fiber has a beat length greater than about 0.5 meters, and at least a portion of the spin impressed on the fiber is alternately clockwise and counter-clockwise with a spin repeat distance of at least 1 meter and a plurality of varying spin reversal distances occurring within the spin repeat distance, wherein the plurality of varying spin reversal distances comprises a minimum spin reversal distance and a maximum spin reversal distance.

12. The method of claim 11 wherein the minimum spin reversal distance is greater than 10 cm.

13. The method of claim 11 wherein the ratio of the maximum spin reversal distance divided by the spin repeat distance is less than 0.5.

14. The method of claim 11 wherein the spin repeat distance is greater than 1 m.

15. The method of claim 11 wherein the spin repeat distance is greater than about 10 m and the beat length of the fiber is between about 0.5 and 5 m.

16. The method of claim 11 wherein the spin repeat distance is greater than about 100 m and the beat length of the fiber is greater than about 1 m.